CS 867 / QIC 890
Quantum Query and Communication Complexity
Spring 2023 Course Outline

Last revised: May 8, 2023
Course website: https://cs.uwaterloo.ca/~s4bendav/course/cs867qic890s23/
Course message board: piazza.com/uwaterloo.ca/spring2023/cs867qic890
Instructor: Shalev Ben-David

Please note that the content of this document is decided tentatively at the beginning of the term, and is subject to change.

CS 867 / QIC 890 Description

This course is a graduate reading course on quantum query and communication complexity. We may cover some of the following topics:

1. The query and communication complexity models

2. Shor's and Grover's algorithms in the query model

3. Amplitude amplification/estimation

4. The polynomial method for quantum lower bounds

5. The adversary method for quantum lower bounds

6. Quantum walks

7. Learning graphs

8. approximate logrank and gamma 2 norm

9. quantum information cost

Each week, we will meet on Mondays and Wednesdays at 1:00-2:20pm in room QNC 1201. The classes will include a mix of (1) lectures by the professor introducing new material, (2) student presentations of papers, (3) discussion regarding these papers.

Students will be assessed on the paper presentations and participation in class; however, the main assessment will be a course project. The details are to be determined, but this will likely involve a project proposal, a project presentation, and the project itself (in the form of a document, perhaps 10 pages). Students are encouraged to tackle an open problem for the project.